

In the Claims:

1-8 (cancelled)

9(amended). A method for chemical mechanical polishing of tungsten comprising:
providing a semiconductor substrate comprising on one face tungsten and a dielectric material;

providing a chemical mechanical polishing composition comprising between about 0.5% and about 10% periodic acid, between about 0.1% and about 10 % of a secondary oxidizer, a pH adjusting compound to adjust the pH of the composition, ~~and optionally an abrasive~~, wherein the pH of the composition is between about 4 to about 12;

movably contacting the substrate face with a pad exerting between about 0.1 and about 9 psi pressure on the substrate and with the composition under conditions that tungsten is removed at a rate different than the removal of the dielectric material.

10(amended). ~~The process of claim 9~~ A method for chemical mechanical polishing of tungsten comprising:

providing a semiconductor substrate comprising on one face tungsten and a dielectric material;

providing a chemical mechanical polishing composition comprising between about 0.5% and about 10% periodic acid, between about 0.1% and about 10 % of ~~wherein the secondary oxidizer comprises potassium peroxy monosulfate, imidazole, malonic acid, or malonamide~~ , and a pH adjusting compound to adjust the pH of the composition, wherein the pH of the composition is between about 4 to about 12; and

movably contacting the substrate face with a pad exerting between about 0.1 and about 9 psi pressure on the substrate and with the composition under conditions that tungsten is removed at a rate different than the removal of the dielectric material.

11 (original). The process of claim 9 wherein the chemical mechanical polishing composition comprises at least one of potassium iodate, potassium periodate, or lithium periodate.

12 (original). The process of claim 9 wherein the chemical mechanical composition comprises ammonium persulfate, peracetic acid, oxalic acid, NH_4HF_2 , or a mixture thereof.

13 (amended). The process of claim 9 wherein the secondary oxidizer comprises ~~hydrogen peroxide, a perborate, a peroxide, or a urea hydrogen peroxide complex.~~

14 (original). The process of claim 9 wherein the chemical mechanical polishing composition additionally comprises an organic acid selected from the group consisting of gluconic, malonic acid, lactic acid, succinic acid, tartaric acid, citric acid, oxalic acid, or salts thereof.

15 (amended). The process of claim 9 further comprising a second polishing operation comprising the steps of:

providing a second chemical mechanical polishing composition comprising an oxidizer, a pH adjusting compound to adjust the pH of the composition, ~~and optionally an abrasive~~, wherein the pH of the composition is between about 3 to about 12; and

movably contacting the substrate face with a pad exerting between about 0.1 and about 9 psi pressure on the substrate and with the second composition under conditions that tungsten is removed at a rate different than the removal of the dielectric material.

16 (amended). The process of claim 9 15 wherein the second chemical mechanical polishing composition comprises 0.5% and about 10% periodic acid, a pH adjusting compound to adjust the pH of the composition, ~~and optionally an abrasive~~, wherein the pH of the composition is between about 3 to about 12.

17- 47 (cancelled)

48 (New). The method of claim 9 wherein the secondary oxidizer comprises potassium peroxydisulfate.

49 (New). The method of claim 9 wherein the secondary oxidizer comprises potassium iodate.

50 (New). The method of claim 9 wherein the secondary oxidizer comprises potassium periodate.

51 (New). The method of claim 9 wherein the secondary oxidizer comprises lithium periodate.

52 (New). The method of claim 9 wherein the secondary oxidizer comprises ammonium persulfate.

53 (New). The method of claim 9 wherein the secondary oxidizer comprises peracetic acid.

54 (New). The method of claim 9 wherein the secondary oxidizer comprises NH_4HF_2 .

55 (New). The method of claim 9 wherein the secondary oxidizer comprises a peroxyhydrate.

56 (New). The method of claim 9 wherein the secondary oxidizer comprises a urea hydrogen peroxide complex.

57. (New). A method for chemical mechanical polishing of tungsten comprising: providing a semiconductor substrate comprising on one face tungsten and a dielectric material;

providing a chemical mechanical polishing composition comprising between about 0.5% and about 10% periodic acid, between about 0.1% and about 10 % of imidazole or malonamide , and a pH adjusting compound to adjust the pH of the composition, wherein the pH of the composition is between about 4 to about 12; and

movably contacting the substrate face with a pad exerting between about 0.1 and about 9 psi pressure on the substrate and with the composition under conditions that tungsten is removed at a rate different than the removal of the dielectric material.

58. (New). A method for chemical mechanical polishing of tungsten comprising:

providing a semiconductor substrate comprising on one face tungsten and a dielectric material;

providing a chemical mechanical polishing composition comprising between about 0.5% and about 10% periodic acid, between about 0.1% and about 10 % of oxalic acid, and a pH adjusting compound to adjust the pH of the composition, wherein the pH of the composition is between about 4 to about 12; and

movably contacting the substrate face with a pad exerting between about 0.1 and about 9 psi pressure on the substrate and with the composition under conditions that tungsten is removed at a rate different than the removal of the dielectric material.

59 (New). The process of claim 10 wherein the chemical mechanical polishing composition additionally comprises an organic acid selected from the group consisting of gluconic acid, lactic acid, succinic acid, tartaric acid, citric acid, oxalic acid, or salts thereof.

60 (New). The process of claim 10 wherein the chemical mechanical polishing composition additionally comprises an abrasive.

61 (New). The process of claim 10 wherein the chemical mechanical polishing composition additionally comprises imidazole or malonamide.

62 (New). The process of claim 10 further comprising a second polishing operation comprising the steps of:

providing a second chemical mechanical polishing composition comprising an oxidizer, a pH adjusting compound to adjust the pH of the composition, and optionally an abrasive, wherein the pH of the composition is between about 3 to about 12;

movably contacting the substrate face with a pad exerting between about 0.1 and about 9 psi pressure on the substrate and with the second composition under conditions that tungsten is removed at a rate different than the removal of the dielectric material.

63 (New). The process of claim 62 wherein the second chemical mechanical polishing composition comprises 0.5% and about 10% periodic acid, and a pH adjusting compound to adjust the pH of the composition, wherein the pH of the composition is between about 3 to about 12.